

## RISK PERCEPTION COMPUTER ACTIVITY

### For the Teacher:

#### Computer Equipment Required

This computer activity can be run on an IBM or IBM-compatible personal computer.

#### Student Directions

Directions for students are included in *Risk Perception Computer Activity* on the previous page.

#### For More Efficient Use of Computer Time

Before students sit down at the computer terminal, they should have access to a list of the 30 items they will be ranking. This will allow them to think over the options and compare them ahead of time. If each student does the entire exercise on-line, it will take a lot of time for the class to complete the activity.

#### Resetting the Program

At the beginning of each class, clear rankings of previous classes by typing INITCL <Enter>. This will delete the ranking of the previous class so the new class can see only its own class ranking.

#### Preparing the Computer

To begin the program, put the 3-1/2" or 5-1/4" disk in the drive that accepts these disks. Then change the directory to that drive. For example, put the 3-1/2" or 5-1/4" disk in drive A:> and then type A: at your C:> prompt so that you are working on the A:> drive. At the A:> prompt, type RANK and the program will begin to run.

**Order disk free of charge  
from the OCRWM National Information Center at 1-800-225-6972;  
within Washington, DC, 488-6720**



# PROBABILITY

## The Language of Risk Assessment

### Purpose:

This lesson will demonstrate how scientists and decision makers, who are involved in determining methods of protecting health or improving safety, quantify relationships among risks by developing mathematical probabilities. Using probabilities facilitates discussion and comparison of risks related to science and technology in a more systematic manner. Students will develop an appreciation for the fact that (1) judgment is an inevitable element in selecting criteria for quantifying risk, and (2) someone still has to make the decision of whether or not this level of risk is acceptable.

### Concepts:

1. Scientists quantify relationships among risks by developing mathematical probabilities.
2. Every human activity involves some degree of risk.
3. Judgment is an inevitable element in selecting criteria for quantifying risk.
4. Someone has to make the decision of whether or not a level of risk is acceptable.

### Duration of Lesson:

One 50-minute class period

### Objectives:

As a result of participation in this lesson, the learner will be able to:

1. discuss probabilities and risk assessment on an introductory level; and
2. discuss limitations of using probabilities in making societal decisions.

### Skills:

Discussing, reading

### Vocabulary:

Acceptable level of risk, probabilities, quantify, risk assessment

### Materials:

Reading Lesson

*Probability: The Language of Risk Assessment*, p. SR-15

Activity Sheet

*Probability: The Language of Risk Assessment*, pp. 65, 66

### Suggested Procedure:

1. A key factor in any discussion of risk assessment is calculation of the probability that an event will occur. It is important for students to understand that probabilities are simply that — probabilities — and offer no guarantees. Additionally, using probabilities has limitations.
2. You may wish to begin this study of probabilities by discussing the definition of probability. Once students feel comfortable with the terminology, assign the reading lesson entitled *Probability: The Language of Risk Assessment*. Allow approximately 15 minutes for reading and then discuss briefly.

### Sample Discussion Questions:

- a) Name a few ways in which you use probability or are affected by probability in your daily life.

*(Deciding whether to carry an umbrella, wear a coat, evacuate your home in the face of a hurricane warning, etc. If you drive a car, the insurance rates are determined by insurance companies using probabilities.)*

- b) Why are probabilities involving health and safety risks to humans more difficult to determine than those dealing with card games?

*(Probabilities involving health and safety risks to humans are more difficult to determine than many other types because a vast body of knowledge is often required before making predictions and testing of the whole system is not feasible.)*

- c) A common rule used in some cases by regulators involved in determination of human health risks is that a technology (new chemical, new industrial plant) is “safe” if exposure to the technology does not raise the health risk of the human population by more than one chance in one million. What do you think of this rule? What are some complications that might arise?

*(Answers may vary; however, when discussing possible complications you should look for students to mention such things as the difficulty in knowing the rate of cancer or accidental deaths in a population before introducing a new exposure, background probability of health risks, use of animals in laboratory experiments, and the fact that biological differences between the test population [laboratory animals] and the human population introduce some uncertainties.)*

- d) Think of some event you have heard of recently (through the newspaper, TV, radio, family, friends, teachers, etc.) that could have been predicted through use of probabilities. Explain or illustrate why you think this particular event could have been predicted.

#### Note:

These questions might lend themselves to some good small group discussions with each group “reporting back” to the class on the results of their discussion.

When you have concluded the class discussion, assign the reading review entitled *Probability: The Language of Risk Assessment* to be completed in class or for homework.

Once students have completed the exercises, have volunteers go to the chalkboard to demonstrate how they worked specific problems. If you used this as a group activity, have each group choose a representative to share their answers.

As a culminating exercise for this lesson you may wish to have students discuss or write an essay on the function that risk assessment and probabilities serve in a technological society.

*(Risk assessment and the development of probabilities are a blend of the predictive power of the sciences, which varies depending on the specific process, with analyses of human behavior. They attempt to bridge the gap between the sciences and the need for a decision-making tool in a technological society. The risks of a new or existing technology can be estimated and weighed against the benefits of that technology and the things the society values.)*

**Teacher Evaluation of Learner Performance:**

Discussion participation and response to reading review will indicate level of comprehension.

**Enrichment:**

*Probability Exercises*, p. 71

*Probability Exercises: Challenge Level*, p. 73